Spring 2015

The Ability of Music to Facilitate Social Bonding during Imagined Intergroup Contact

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Undergraduate Honors Thesis

April 6, 2015

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Abstract

Although scholars from many disciples have contributed hypotheses to explain why humans are a musical species, relatively little empirical evidence exists in favor of any perspective. I argue that music evolved as a tool to facilitate social bonding and is, therefore, able to make people feel more connected to one another. If this is the case, then music may be able to facilitate the reduction of prejudice by helping members of different social groups bond with one another. I investigate this hypothesis through two studies using imagined intergroup contact – a prejudice reducing manipulation. Participants imagined interacting with another student (either black or white) while listening to positive, negative, or no music. Following this manipulation, attitudes towards the African American social group were measured both implicitly and explicitly. The results are not fully consistent with the hypothesis that experiencing music while imagining interacting with an outgroup member will facilitate bonding with that individual and, in turn, reduce prejudice towards that individual's social group. Throughout these two studies, the results did not provide consistent evidence for the hypotheses.

Music is not simply an invention of culture, an art form, or a modern fad. Rather, it is a universal phenomenon which has persisted across countless cultures throughout history. Every known culture to exist in modern times makes or made music (Huron, 2001). Additionally, based on archeological evidence, the earliest known musical instrument is a bone flute which was fashioned from the femur of the now-extinct European cave bear (Turk, 1997). This Paleolithic flute is estimated to be between 43,000 and 82,000 years old. Since complex evolutionary adaptations arise on timescales of many millennia, these facts suggest that music may be an evolved human trait.

This hypothesis is supported by evidence that humans process music using specialized neural pathways. Studies of patients with congenital amusia suggest that music is processed using a specialized pathway based in the right hemisphere of the brain (Hyde, Zatorre, Griffiths, Lerch, & Peretz, 2006; Peretz, 2006). This right hemispheric localization of music processing has also been observed in newborns, as early as the first postnatal hours (Perani et al., 2010). This finding indicates that specialized music processing is an innate neurological function, and is not acquired through general learning. In addition, studies of patients with lesion-induced amusias show that some individuals with brain lesions are unable to recognize music despite retaining normal processing and memory capabilities for other auditory and linguistic stimuli (Eustache, Lechevalier, Viader, & Lambert, 1990; Peretz, 1996). These facts suggest that, over time, specialized neural circuitry has evolved in order to support human musicality.

Theories on the Evolved Function of Music

The earliest theorization regarding the evolved function of music can be traced back to Darwin's (1871) *Descent of Man*, in which he suggested that human musicality developed due

to sexual selection pressures. Similarly to how many male birds produce elaborate songs in order to attract potential mates, the human use of music could have evolved as a courtship behavior in service of mate selection. However, sexual selection is typically accompanied by sexual dimorphism, a phenotypic difference between males and females, since one sex displays the trait in order to court the other sex (e.g., see Andersson, 1994). Because there is no convincing evidence that either human sex is more musical than the other, this weakens the claim that musicality is a sexually selected trait.

In addition, humans commonly perform complex, coordinated musical pieces in groups, as opposed to solo or lek performances like the sexual selection hypothesis would suggest. For this reason, human musicality might be compared to the duets performed by monogamous species, such as gibbons. Darwin originally attributed gibbon singing to courtship, but there is little evidence to suggest that this is the case (Mitani, 1988). Rather, evidence suggests that monogamous gibbon pairs sing to defend territory and strengthen pair bonds (see Geissmann, 2000). Importantly, these musical performances are cooperative, coordinated, and involve both sexes. This explanation of music seems to be more applicable to humans than the competitive, individual, single-sex nature of courtship singing.

However, human musical performance generally extends beyond duets to larger groups, sometimes even a whole community or tribe. Just as individual singing provides an individual-level benefit when explained by courtship and duet singing provides a familial-level benefit when explained by territory protection and pair bonding, group singing in humans is probably best explained by a group-level benefit (See Brown, 2000).

Indeed, many scholars have explained the evolutionary advantage of human musicality at the group level. It has been argued that music may be a tool for creating social bonds (e.g., Dunbar, Kaskitis, MacDonald, & Barra, 2012; Freeman, 2000), a signal of group cohesiveness (e.g., Hagen & Bryant, 2003), a social reward system (e.g., Brown, 2000), and a device of social coordination (e.g., Loersch & Arbuckle, 2013; Roederer, 1984). These hypotheses share the common thread that music is a tool of social living. Although little empirical evidence exists in favor of any specific evolutionary explanation of music, the data that do exist suggest that music helps us live in social groups.

For example, Loersch and Arbuckle (2013) demonstrated that people's emotional responses to music are tied to the other core social processes which facilitate group living. They demonstrated that participants' levels of musical reactivity, the extent to which they are affected by music, predicts their social behavior in other non-musical domains. Those individuals who were most strongly influenced by music were also the most sensitive to non-musical forms of social information. Importantly, they also demonstrated that levels of musical reactivity could be affected by manipulating a participants' desire to belong to a social group, establishing a causal relationship between musical reactivity and social processes. These findings suggest that human musicality was selected for by the same evolutionary mechanisms which selected for other social behaviors.

As opposed to this intragroup social function, Hagen and Bryant (2003) argue that music serves an intergroup social function. Their research suggests that music evolved as a communication system which can reliably provide information about a group, such as coalition quality. People in a high quality coalition are more likely to like each other, have known each

other for longer, and help one another. In their study, participants who listened to music with poor synchronization rated the music as lower quality in addition to rating the group of musicians as a lower quality coalition. Since the production of music requires a group to carefully coordinate its behavior, the quality of their music can credibly relay information about the social strength of the group. This information can allow other groups to make informed decisions about cooperation and competition with this group.

Finally, Dunbar et al. (2012) argue that music evolved to facilitate social bonding. Since endorphins are a chemical mediator of the bonding process, the authors hypothesized that music making would trigger endorphin release. They inferred the amount of endorphin release by measuring changes in pain tolerance and positive affect following a musical experience. They found that people who participated in making music showed higher levels of pain tolerance and positive affect, compared to people who passively listened to music. The implications of these results are limited by their use of natural groups, small sample sizes, and indirect measurement of endorphin release. However, they do suggest that the origins of music lie in its ability to promote social bonding within groups, thereby facilitating group living.

Though the existing body of evidence is small, it does suggest that music evolved as a social process. The current work looks to expand upon this evidence by examining this hypothesis within the context of intergroup relations. I argue that music serves to facilitate bonding with anyone, regardless of their social group. If music is able to facilitate bonding with a member of a minority social group, then this strengthened social bond may translate to improved attitudes and behaviors towards other members of that group. For this reason, music could be used as part of an intervention to reduce bias between social groups.

Intergroup Bias

Intergroup bias refers to the tendency to favor one's own social group (the ingroup) over a social group with which one does not identify (the outgroup). Social identity theory (Tajfel & Turner, 1979) explains the psychological motivation behind intergroup bias. It states that a portion of a person's sense of self arises from their identification with various groups. Due to this link between the self and the group, favoring the ingroup over outgroups will create a more positive view of the self by increasing ingroup status and success (see Ashforth & Mael, 1989; Hogg & Abrams, 1990; Rubin & Hewstone, 1998). A parallel explanation of this motivation lies in the fact that humans are adapted to group living (see Brewer & Caporael, 2006; Caporael & Brewer, 1995). As it became increasingly adaptive to live in social groups, individual survival became intertwined with group survival. For this reason, favoring the ingroup can be explained by the intrinsic biological motivation to ensure the survival of one's genes, in addition to the psychological motivation to improve one's self-view.

Research has shown that intergroup bias can take the form of positivity towards the ingroup and/or negativity towards the outgroup (e.g., Brewer, 1999). Bias is most commonly seen in the form of ingroup favoritism (e.g. Brewer, 1999, 2001). Ingroup favoritism includes thoughts or behaviors towards the ingoup which are more positive than those towards the outgroup.

While ingroup favoritism only involves positive biases towards the ingroup, these processes can also lead to negative attitudes (i.e., prejudice) and behaviors (i.e., discrimination) against outgroups. Outgroup derogation most commonly arises when outgroups or outgroup members are associated with strong emotions, such as fear, hatred, or disgust (e.g., Mackie,

Devos, & Smith, 2000; Smith, Seger, & Mackie, 2007). One key moderator of these emotions is threat (see Brewer, 1999; Hagendoorn, Linssen, & Tumanov, 2013). An outgroup may be perceived as a threat if, for example, groups are in completion over limited resources (see Esses, Dovidio, Jackson, & Armstrong, 2001; Esses, Jackson, & Armstrong, 1998) or the outgroup poses a threat to the ingroup's culture (see Esses, Haddock, & Zanna, 1993). Although outgroup derogation is less common than ingroup favoritism, it can have staggering effects which range from bullying to genocide. Research has identified both psychological and social interventions which can reduce intergroup bias and, in turn, combat the negative effects of outgroup derogation.

A prominent psychological strategy for bias reduction is outlined by the common ingroup identity model (Gaertner, Dovidio, Anastasio, Bachman, & Rust, 1993). This model suggests that bias can be reduced by transforming an individual's perception of two groups into one common group (i.e., a shift from "us" and "them" to "we"). The most prominent social intervention for bias reduction is intergroup contact, which seeks to accomplish this change through positive interpersonal contact between members of majority and minority groups.

Bias Reduction through Contact

Direct Intergroup Contact

The concept of intergroup contact was first introduced by Allport's (1954) contact hypothesis, which proposes that prejudice between groups can be reduced through positive intergroup contact if four conditions are met: the groups hold equal status, share common goals, exhibit cooperation, and have the support of institutions. Research over the past half century has examined Allport's hypothesis through many experiments (e.g., Cook, 1969, 1978),

surveys (e.g., Herek & Capitanio, 1996), and quasi-experimental field studies (e.g., Deutsch & Collins, 1951). Over time, this work has also expanded beyond its original scope of racial tensions to demonstrate the positive effects of contact on a variety of other prejudices, including those based on: religion (e.g., Pettigrew, Christ, Wagner, & Stellmacher, 2007), age (e.g., Caspi, 1984), physical disability (e.g., Anderson, 1995), mental disability (e.g., Desforges, et al., 1991), and sexual orientation (e.g., Eskilson 1995).

Pettigrew and Tropp's (2006) meta-analysis of over 500 studies found that intergroup contact reliably reduces prejudice, regardless of the type of study (e.g., experimental vs. quasi-experimental) or the target group. Their findings also show a positive effect of contact even in the absence of Allport's four required conditions. However, the positive effects of contact can drastically increase if Allport's conditions are met, so it is helpful to view them as facilitating factors for reducing bias, rather than mandatory conditions (Pettigrew & Tropp, 2006). Research has shown that contact reduces prejudicial bias by reducing intergroup anxiety, increasing empathy and perspective taking, and enhancing knowledge about the outgroup (Pettigrew & Tropp, 2008).

Indirect Intergroup Contact

Extended contact. In many situations where problematic intergroup relations exist it is not feasible for members of the groups to engage in direct face-to-face contact due to geographic or social constraints. In these circumstances, indirect contact can be substituted for direct contact. One type of indirect contact is extended contact. The extended contact hypothesis proposes that learning a fellow ingroup member is close friends with an outgroup member can reduce bias against that group (Wright, Aron, McLaughlin-Volpe, & Ropp, 1997).

Extended contact has improved outgroup attitudes in a number of settings. For example, a study among Catholic and Protestant students in Northern Ireland revealed that extended contact was associated with lower levels of outgroup prejudice (Paolini, Hewstone, Cairns & Voci, 2004), and in a study involving white and South Asian undergraduates, extended contact was associated with more positive outgroup attitudes (Turner, Hewstone, Voci, & Vonofakou, 2008). The reduction of bias in both of these studies, as well as others (e.g., Turner, Crisp, & Lambert, 2007), was largely mediated by reduced intergroup anxiety. This suggests that extended contact works in a similar fashion to direct contact.

While extended contact is able to greatly increase the possibility for intergroup contact, it still poses limitations because it requires that someone within a person's social network have positive direct contact with an outgroup member. In situations where segregation diminishes the opportunity for extended contact, imagined intergroup contact can be used to reduce intergroup bias.

Imagined contact. Imagining interacting with an outgroup member can produce a similar, though less pronounced, reduction of bias as these other forms of intergroup contact (e.g., Crisp & Turner, 2009; Turner & Crisp, 2010) . Similarly to direct and extended contact, the effects of imagined intergroup contact can reliably be explained by a reduction in intergroup anxiety following contact (e.g., Crisp & Turner, 2009; Husnu & Crisp, 2010a; Turner, Crisp, & Lambert, 2007). In addition, Turner et al. (2007) demonstrated that simply imagining an outgroup member does not elicit the same effects as imagining an interaction with an outgroup member, demonstrating that imagined contact effects rely on the contact experience generated by the participants.

Imagined contact has produced positive effects in a variety of contexts, including the inter-ethnic conflict between Turkish Cypriots and Greek Cypriots in Cyprus (Husnu & Crisp, 2010b). This intervention has also been effective with children as young as nine years old in a study where imagined intergroup contact improved the behavioral intentions and attributions of human emotions to immigrant children by Italian fourth-graders (Vezzali, Capozza, Stathi, & Giovannini, 2012).

One key feature of imagined intergroup contact is that it can improve people's intent and interest in engaging in face-to-face contact with an outgroup member in the future (Crisp, Husnu, Meleady, Stathi, & Turner, 2010). This implies that imagined contact may be useful as an initial step towards direct contact in real-world situations where group members are not initially willing to engage with one another.

The Current Research

Research on the evolved function of music has provided evidence that music may have evolved in support of group living by aiding in social bonding. The current research investigates this hypothesis using the imagined intergroup contact paradigm in order to examine whether music's ability to facilitate interpersonal bonding can amplify the bias reducing effects of intergroup contact. Specifically, I hypothesize that sharing a musical experience with an outgroup member during an imagined interaction will more effectively reduce intergroup bias than imagining the same contact experience without music.

Study 1

Participants

One hundred fifty students from the University of Colorado participated for experimental credit in partial fulfillment of a course requirement. Demographic questions were asked about participants' gender (93 female, 57 male), ethnicity (70.0% Caucasian, 10.7% Asian, 8.0% multiple ethnicities, 6.7% Hispanic, 2.0% African American, 0.7% Native Hawaiian or other Pacific Islander, and 2.0% other/no response), age (92% of participants were between 18 and 20 years of age, 6% were 21-25, 1.3% were under 18, and 0.7% were over 30 years old), and country of birth (92.7% were born in the United States). Those who were not born in the United States were asked to indicate how many years they had lived in the country. Three participants who had lived in the United States for less than five years were excluded from the sample due to concerns that they may not have knowledge of African American stereotypes. The three individuals who identified as African American were also excluded from data analysis, as was one participant who indicated that he did not take the experiment seriously (assessed in a final question at the conclusion of the experiment), leaving a final sample of 143 participants.

Materials and Procedure

Participants were randomly assigned to one of six between-subjects conditions created by a 2 (race of imagined interaction partner: Black vs. White) X 3 (music exposure: positive, negative, or none) factorial design. After completing the consent process, participants were taken to an individual room where they completed the entire study on a computer.

Imagined contact task. To begin the experiment, all participants were told that they were about to be shown a picture of another CU student along with a list of that individual's

two favorite songs. Participants were asked to "*spend the next couple minutes imagining yourself meeting this person. Imagine that during the encounter you learn some interesting and unexpected things about the other student*."

During the two minute imagination period, participants were presented with a picture of themselves (taken by the experimenter at the beginning of the experiment) and a picture of their imagined interaction partner. A picture of either a black or white student was presented to participants as their "imagined contact partner," based on the experimental condition. The individuals in these photos were both female CU students with a generally similar appearance, aside from skin tone.

During the imagination period, participants were also presented with two of their partner's "favorite" songs. Participants randomly assigned to listen to music listened to one of these two songs during the imagination period. The same two songs were presented to all participants. Participants in the positive music condition listened to "Soul Makossa" by Manu Dibangi, which is a happy fast song. Participants in the negative music condition listened to "Mercy Now" by Mary Gauthier, which is a slow, sad song. Before beginning the imagined contact task participants were asked to provide two of their favorite songs. This encouraged participants to construe their imagined interaction partner as another student who had previously taken part in the research.

After two minutes the task automatically ended. In order to reinforce the impact of the manipulation, participants were asked to list a couple of the specific things they imagined learning about their interaction partner (see Turner et al., 2007).

Implicit measure of attitudes. Following the imagined contact task, participants completed an implicit association test (IAT; Greenwald, McGhee, & Schwartz, 1998) to measure levels of bias against the African American social group. In this task, participants were required to categorize a series of words into four categories (pleasant, unpleasant, black, and white). Participants were asked to categorize each word as quickly as possible using one of two response keys.

On simple trials, participants were presented with stimuli related to just two categories (i.e., pleasant vs. unpleasant or black vs white). On the critical task trials, however, participants were presented with words from all four categories. Each of the two response keys was then used to identify two separate categories of words. The level of association between two categories determines the ease with which an individual can categorize them using the same response key (e.g., see Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Therefore, by varying the categories that share a response, an IAT can be used to measure the extent to which two concepts are associated.

Here, prejudicial bias towards African Americans was measured implicitly by pairing standard positive and negative words (e.g., *happy, honor, sunrise; filth, sickness, tragedy*) with both stereotypically Caucasian American names (e.g., *Andrew, Ian, Megan, Sue-Ellen*) and stereotypically African American names (e.g., *Lakisha, Lavon, Terrence, Tameisha*). The category labels used throughout the task were *Pleasant, Unpleasant, Black,* and *White*. During two stereotype-consistent critical blocks, participants saw stimuli from all four categories and were required to categorize each as either “White or Pleasant” (using one key) or “Black or Unpleasant” (using the other key). The two stereotype-inconsistent critical blocks used the

reverse categorization pairings (i.e., "*White or Unpleasant*" vs. "*Black or Pleasant*"). Participants completed three simple blocks and four critical blocks (two stereotype-consistent and two stereotype-inconsistent).

Levels of bias against the African American social group were measured by assessing the relative ease with which participants associated Caucasian American names with positivity and African American names with negativity. I followed the recommendations of Greenwald, Nosek, and Banaji (2003) to compute an IAT d-score using participants' response latencies. The d-score is the normalized difference in mean response times between the stereotype-inconsistent and stereotype-consistent blocks, with a higher score indicating a higher level of bias. Response latencies from all four critical blocks were used, and response latencies below 400 ms or above 10,000 ms were deleted. Response latencies for trials where the participant made an error were replaced with the mean response latency for that block plus a 600 ms error penalty.

Explicit measure of attitudes. Following the IAT, participants completed a series of six semantic differential scales assessing their attitudes towards the African American social group (from Turner et al., 2007). Participants were asked to "*indicate on a scale of 1 to 7 how they feel about the African American social group*," with 1 being a positive attribute and 7 being a negative attribute. Scales included: warm–cold, positive–negative, friendly–hostile, trusting–suspicious, respect–contempt, admiration–disgust. Responses for these six items were averaged to create an index score, where a higher score indicates a more positive attitude towards the African American social group. These scores were adjusted to create a scale of -3 (negative) to 3 (positive) so that a neutral attitude has a score of 0.

Ancillary measures. Although not of primary focus for this work, participants also completed several additional dependent measures. These are reported below for completeness. However, all reported analyses will focus on the key dependent measures described above.

Mood assessment. Participants were also asked to rate the feelings they had experienced during the imagined contact task using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). This assessment consists of 20 words that describe different feelings and emotions (e.g., *afraid, distressed, enthusiastic, excited, interested, nervous,*). Participants rated the extent to which each word described the emotions they felt during the imagined contact task using a 5-point scale ranging from 1 (*Very slightly or not at all*) to 5 (*Extremely*).

Musical reactivity assessment. After the mood assessment, participants completed the musical reactivity questionnaire (Loersch & Arbuckle, 2013). Participants were asked to rate the extent to which 15 different statements describe their reactions to music on a 7-point scale ranging from 1 (*Not at all*) to 7 (*Completely*). Sample statements include: "*When I hear a fast song, I feel like becoming more active*," "*When I listen to music, I can feel it in my body*," "*When I listen to music, I can feel it affect my mood*," and "*When I hear music, my foot starts tapping along with the beat*."

University of Colorado ingroup identification. Next, participants completed two measures designed to assess levels of identification with the University of Colorado. The first was a pictorial measure of self-group overlap (Schubert & Otten, 2002). This item presented participants with six images that represented varying amounts of overlap between their self and the University of Colorado. Each image contained two circles of different colors, with one

representing the self and the other representing the group. These were arranged to create a linear scale, ranging from 1 (no overlap, two circles separated by space) to 6 (complete overlap, two merged circles). Participants were asked to select the one option that best represents the amount of overlap between their self and the University of Colorado.

Participants were also asked to answer nine questions about their identification with the university (Loersch & Arbuckle, 2013) using a 7-point scale ranging from 1 (*Not at all/Nothing/Never*) to 7 (*Very Much/A lot/All the time*). Sample questions include: "*To what extent do you feel pride when learning of the accomplishments of other University of Colorado students*," "*How important is being a University of Colorado Buffalo to you*," and "*How much do you have in common with other students who attend the University of Colorado*?"

Demographics. Finally, participants were asked to provide the following demographic information: sex, ethnicity, age, country of birth, and amount of time lived in the US. Participants were also asked the following questions about this study: "*Have you participated in any similar experiments? If yes, how so*," "*Was there anything strange or suspicious about this experiment? If yes, what was it*," "*Do you feel that any task in this experiment influenced your responses on another part of the experiment? If yes, how so*," and "*Please rate how seriously you took this experiment on a scale of 1 to 5*."

Results

I examined the influence of the manipulations on participants' IAT d-scores using a 2 (imagined contact: black vs. white partner) x 3 (music type: positive, negative, or none) ANOVA (see Figure 1). The only significant effect was the two-way interaction between imagined contact and music type, $F(2,137) = 3.80$, $p = .025$. Simple effects analyses showed

that there was a significant effect of contact condition when participants listened to negative music, $F(1,137) = 5.73$, $p = .018$. Counter to my predictions, participants who imagined contact with a black student were more prejudiced ($M = .52$, $SD = .25$) than participants who imagined contact with a white student ($M = .30$, $SD = .41$). Although non-significant, $F(1,137) = 2.21$, $p = .139$, participants in the control condition who imagined contact with a black student tended to show less prejudice ($M = .37$, $SD = .39$) than participants who imagined contact with a white student ($M = .50$, $SD = .27$). There was no effect of contact condition for participants who listened to positive music, $F < 1$.

I also examined the influence of the manipulations on participants' self-reported attitudes towards the African American social group using a 2 (imagined contact: black vs. white partner) x 3 (music type: positive, negative, or none) ANOVA. There was a main effect of imagined contact, $F(1,137) = 6.75$, $p = .010$, that was not qualified by a higher order interaction with music type, $F(2,137) < 1$. Consistent with the prior literature on imagined contact (e.g., Turner et al., 2007; Crisp & Turner, 2009), participants who imagined interacting with a black student ($M = 2.05$, $SD = 0.91$) felt significantly more positive towards the African American social group than did participants who imagined interacting with a white student ($M = 1.59$, $SD = 1.16$).

Discussion

The imagined contact manipulation elicited mixed effects, seeming to make participant's more biased against African Americans on the implicit measure of attitudes but less biased against African Americans on the explicit measure of attitudes. While there was a significant two-way interaction between music and contact on the implicit measure of attitudes,

this effect was not apparent on the explicit measure of attitudes. There are a few aspects of this study that could have contributed to these mixed effects. Since I included the music based on the guise that it was the imagined contact partner's favorite song, this may have led participants to make attributions about the partner based on the song they heard (e.g., learning that a minority group member likes negative music could reinforce negative stereotypes about that person). Additionally, the specific positive song I used was of African origin, which could have invoked racial stereotypes or otherwise interfered with the effects of the manipulations.

Study 2

In order to clarify the mixed results from the original study, I modified Study 1 and conducted a second experiment. To eliminate the possibility that participants would make judgments about their imagined contact partner based on the song, I arranged the imagined contact task so that the selection of the music was not attributed to the imagined contact partner. Additionally, in order to minimize the chance that idiosyncratic aspects of a specific song would have an impact on the effect of the manipulation, I chose to use five different songs for each music condition, rather than one for each condition.

In order to amplify the effects of the imagined contact manipulation I made the task more vivid (see Husnu & Crisp, 2010a) by providing specific information about the location of and reason for this imagined interaction. I also incorporated the concept of working together on a school project because cooperation and working towards a common goal has been shown to increase the effects of intergroup contact (e.g. Sherif, Harvey, White, Hood, & Sherif, 1961).

In order to determine if the manipulation was specifically targeting attitudes towards the African American social group, I also measured self-reported attitudes towards the

Caucasian American social group, both imagined contact partners, and the participant's self. Additionally, I chose to split the bipolar attitude scales into their unipolar equivalents. Measuring the positive and negative components of attitudes separately, rather than as one net attitude, will allow me to more precisely determine the reason for a change in attitude (see Cacioppo, Gardner, & Berntson, 1997).

Participants

One hundred sixty-two students from the University of Colorado participated for experimental credit in partial fulfillment of a course requirement. Demographic questions were asked about participants' gender (93 female and 69 male), ethnicity (68.5% Caucasian, 11.1% Asian, 7.4% multiple ethnicities, 6.2% Hispanic, 3.1% African American, 1.2% American Indian or Alaskan Native, 1.2% Native Hawaiian or other Pacific Islander, and 1.2% other/prefer not to respond), age (87.7% of participants 18-20 years old, 9.9% were 21-25, 1.9% were 26-30, and 0.6% were 30 or older), and country of birth (92% of participants were born in the United States). Those who were not born in the United States were asked to indicate how many years they had lived in the country, and all had lived in the United States for at least five years. The five participants who identified as African American were excluded from the sample. In addition, eight other participants were excluded for various reasons: five participants satisficed (Krosnick, Narayan, & Smith, 1996) and provided straight-line responses on the explicit measure of attitudes, one participant knew one of the individuals being presented as an imagined contact partner, one participant admitted in a free-response to not completing the imagined contact task, and one participant was excluded due to experimenter error. This left 149 participants in the final sample.

Materials and Procedure

As in Study 1, participants were randomly assigned to one of six between-subjects conditions created by a 2 (race of imagined interaction partner: Black vs. White) X 3 (music exposure: positive, negative, or none) factorial design. After completing the consent process, participants were taken to an individual room where they completed the entire study on a computer.

Imagined contact task. To begin the imagined contact task, all participants were prompted to "*spend the next couple minutes imagining yourself meeting another student for the first time. Imagine that you have been assigned to work on a class project with this student, and you are meeting in the UMC to work on your project together. Imagine that you two are productive in working on your project and that you learn some interesting and unexpected things about the other person*."

During the two minute imagination period participants were presented with a few visual aids in order to increase the vividness of the imagined interaction. Participants were provided with the picture of themselves (taken by the experimenter at the beginning of the experiment) and a picture of their imagined interaction partner. They were also provided with a picture of students studying in a common area in the University Memorial Center and were asked to imagine that this was the location where they were meeting their partner. Participants randomly assigned to listen to music during the imagined interaction were told to imagine that this song was playing over the speakers in the University Memorial Center while they were meeting their partner. After two minutes the task automatically ended, and participants were

asked to report the interesting things they had imagined learning about their interaction partner, as in Study 1.

The same pictures of imagined contact partners that were used in Study 1 were used again. Participants in the positive music condition were randomly assigned to listen to one of five fast, happy songs ("Best Day of My Life" by American Authors; "Electric Feel" by MGMT; "Keep Your Head Up" by Andy Grammer; "On Top of the World" by Imagine Dragons, or "Wake Me Up Before You Go-Go" by Wham!). Participants in the negative music condition were randomly assigned to listen to one of five slow, sad songs ("Another Lonely Day" by Ben Harper; "Breathe Me" by Sia; "Bulletproof I Wish I Was" by Radiohead; "Colorblind" by Counting Crows; or "Mercy Now" by Mary Gauthier).

Implicit measure of attitudes. Following the imagined contact task, participants completed the same IAT which was used in Study 1.

Explicit measure of attitudes. Following the IAT, participants completed a series of self-report items assessing their attitudes towards five different targets: the African American social group, the black student used as an imagined contact partner, the white student used as an imagined contact partner, the Caucasian American social group, and themselves (in that order). When indicating attitudes towards a specific person, participants were shown the picture of the individual.

Participants were asked to rate the extent to which they felt each of 12 different attributes (e.g., contempt, negativity, respect, suspicion, trust, warmth) towards each target. Attitudes were reported using a 7-point unipolar scale ranging from absence of the attribute at 1 (e.g., *Not at all warm*) to complete presence of the attribute at 7 (e.g., *Extremely warm*).

These twelve items were created by splitting each of the six bipolar scales used in Study 1 into their unipolar equivalents. The order in which the attributes were presented was randomized.

Separate positive and negative attitude scores were calculated by averaging responses across all six positive items and across all six negative items, respectively. To create a measure comparable to Study 1, an overall attitude index score was calculated by subtracting the negative attitude score from the positive attitude score, so a higher score indicates a more positive attitude towards the target.

Additionally, the overall Caucasian American attitude score was subtracted from the overall African American attitude score to create a within-subjects difference score. Here, a score of zero indicates that a participant reported the exact same attitudes towards both the African American social group and the Caucasian American social group. A positive score indicates that the participant felt more positively towards African Americans that towards Caucasian Americans, and a negative score indicates that the participant felt more positively towards Caucasian Americans than towards African Americans. This same process was also used to calculate a difference in attitudes score representing the difference in attitudes between the black student used as an imagined contact partner and the white student used as an imagined contact partner.

Ancillary measures. All of the same ancillary measures included in Study 1 were also administered. In addition, participants who were assigned to a music condition were also asked about the song they heard during the imagined contact task. These individuals were asked to indicate how much they liked the song they heard and how familiar they were with the song

they heard. Both responses were indicated on a 7-point scale ranging from 1 (*Not at all*) to 7 (*Very much*). Also, participants were asked to report their majors.

Results

As in Study 1, I analyzed all dependent measures using a 2 (imagined contact: black vs. white partner) x 3 (music type: positive, negative, or none) ANOVA.

IAT scores. First, I examined the influence of the manipulations on participants' IAT d-scores. Although no effects were significant, the imagined contact manipulation, $F(1,143) = 1.44$, $p = .232$, produced a trend where participants who imagined interacting with a black student ($M = 0.40$, $SD = 0.27$) had a slight tendency to displayed less bias than those who imagined interacting with a white student ($M = 0.45$, $SD = 0.33$). Additionally, there was a non-significant trend for music type, $F(2,143) = 1.44$, $p = .161$. Participants who listened to negative music ($M = 0.36$, $SD = 0.33$) tended to display the least amount of bias, followed by those who did not listen to music ($M = 0.42$, $SD = 0.28$), then those who listened to positive music ($M = 0.48$, $SD = 0.29$).

Self-reported attitudes: African Americans. Next, I examined the influence of the manipulations on participants' self-reported attitudes towards the African American social group using the positive, negative, and overall attitude scores. Unlike in Study 1, the manipulations had no effect on the overall African American attitude score, all Fs < 1.

However, when examining participants' self-reported attitudes towards the African American social group using the index score for only the positive items, there was a marginally significant main effect of imagined contact, $F(1,143) = 3.72$, $p = .056$. Participants who imagined interacting with a black student ($M = 5.50$, $SD = 0.94$) tended to report a more positive attitude

towards the African American social group than participants who imagined interacting with a white student (*M* = 5.21, *SD* = 0.89).

When examining the influence of the manipulations on participants' self-reported attitudes towards the African American social group using the index score for the negative items, the only effect of interest was a trend for imagined contact condition, $F(1,143) = 1.11$, $p = .294$. Counter to my predictions, participants who imagined interacting with a black student (*M* = 2.63, *SD* = 1.14) had a slight tendency to report a more negative attitude towards the African American social group than participants who imagined interacting with a white student (*M* = 2.44, *SD* = 1.06).

Self-reported attitudes: Caucasian Americans. I then examined the influence of the manipulations on participants' self-reported attitudes towards the Caucasian American social group. Although there were no significant effects of the manipulations on the overall Caucasian American attitude score, there was a trend of a two-way interaction, $F(2,143) = 1.86$, $p = .159$ (see Figure 2). Simple effects analyses showed a non-significant effect of contact condition when participants listened to negative music, $F(1,143) = 2.43$, $p = .122$. Participants who imagined interacting with a black student (*M* = 3.07, *SD* = 1.54) had a slight tendency to feel more positively towards the Caucasian American social group than participants who imagined interacting with a white student (*M* = 2.26, *SD* = 1.61). There was no effect of contact condition on participants who did not listen to music or listened to positive music, both Fs < 1.

Again, there were no significant effects of the manipulations on participants' self-reported attitudes towards the Caucasian American social group using the index score for only the positive items, but there was a trend of a two-way interaction, $F(2,143) = 2.33$, $p = .101$ (see

Figure 3). Simple effects analyses showed a significant effect of contact condition when participants listened to negative music, $F(1,143) = 4.94$, $p = .028$. Again, participants who imagined interacting with a black student ($M = 5.67$, $SD = 0.92$) felt more positively towards the Caucasian American social group than participants who imagined interacting with a white student ($M = 4.98$, $SD = 0.97$). There was no effect of contact condition on participants who did not listen to music or listened to positive music, both Fs < 1.

Additionally, I examined the effects of the manipulations on participants' self-reported negative attitudes towards the Caucasian American social group. There were no significant effects, all Fs < 1.

Self-reported attitudes: black individual. I also examined the effects of the manipulations on participants' self-reported attitudes towards both of the individuals used as imagined contact partners and towards themselves, again using the overall attitude score, positive attitude score, and negative attitude score. The manipulations showed no effects on the overall attitude scores towards the black individual used as an imagined contact partner, all Fs < 1.

The only effect of interest of the manipulations on participants' positive attitudes towards the black individual was a non-significant effect of contact condition, $F(1,143) = 2.45$, $p = .119$. Participants who imagined interacting with the black individual ($M = 5.93$, $SD = 0.90$) tended to report more positive attitudes towards the black individual used as an imagined contact partner than participants who imagined interacting with the white individual ($M = 5.69$, $SD = 0.90$).

An examination of the effects of the manipulations on the negative attitude scores towards the black individual revealed no significant effects. The only effect of interest was a non-significant two-way interaction, $F(2,143) = 1.79$, $p = .170$ (see Figure 4). Simple effects analyses showed a marginally significant effect of contact condition when participants listened to negative music, $F(1,143) = 2.77$, $p = .098$. Participants who imagined interacting with the black individual ($M = 1.93$, $SD = 0.87$) tended to report more negative attitudes towards the black individual used as an imagined contact partner than participants who imagined interacting with the white individual ($M = 1.55$, $SD = 0.72$). There was no effect of contact condition on participants who did not listen to music or listened to positive music, both Fs < 1.

Self-reported attitudes: white individual. Analysis of the effects of the manipulations on participants' overall attitude scores towards the white individual used as an imagined contact partner revealed only a marginally significant main effect of contact condition, $F(1,143) = 3.55$, $p = .061$. Participants who imagined interacting with the black individual ($M = 3.58$, $SD = 1.49$) tended to report less positive attitudes towards the white individual used as an imagined contact partner than participants who imagined interacting with the white individual ($M = 4.06$, $SD = 1.29$).

There were no significant effects of the manipulations on participants' self-reported positive attitudes towards the white individual. The only effect of interest was a non-significant two-way interaction between the manipulations, $F(2,143) = 2.00$, $p = .139$ (see Figure 5). Simple effects analyses showed a significant effect of contact condition when participants did not listen to music, $F(1,143) = 3.99$, $p = .048$. Participants who imagined interacting with the black individual ($M = 5.31$, $SD = 1.04$) tended to report less positive attitudes towards the white

individual used as an imagined contact partner than participants who imagined interacting with the white individual (*M* = 5.84, *SD* = 0.93). There was no effect of contact condition on participants who listened to either positive or negative music, both *F*s < 1.

There was only a significant main effect of contact condition, *F*(1,143) = 7.43, *p* = .007, on participants' self-reported negative attitudes towards the white individual. Participants who imagined interacting with the black individual (*M* = 1.19, *SD* = 0.82) reported more negative attitudes towards the white individual used as an imagined contact partner than participants who imagined interacting with the white individual (*M* = 1.57, *SD* = 0.66).

Self-reported attitudes: self. The only effect of interest of the manipulations on participants' overall attitudes towards themselves was a trend for the effect of contact condition, *F*(1,143) = 1.19, *p* = .277. Participants who imagined interacting with the black individual (*M* = 3.83, *SD* = 1.62) had a slight tendency to feel more positively about themselves than did participants who imagined interacting with the white individual (*M* = 3.53, *SD* = 1.57).

The same weak tendency was also present for participants' self-reported positive attitudes towards themselves, *F*(1,143) = 2.50, *p* = 0.116. Again, participants who imagined interacting with the black individual (*M* = 5.89, *SD* = 1.04) had a slight tendency to feel more positively about themselves than did participants who imagined interacting with the white individual (*M* = 5.62, *SD* = 1.00).

The manipulations showed no effects on participants' negative attitudes towards themselves, all *F*s < 1.

Within-subjects difference scores. Next, I examined the influence of the manipulations on each of the within-subjects difference scores. Examining participants' differences in

attitudes towards the black individual and the white individual revealed a significant main effect of imagined contact, $F(1,143) = 11.36$, $p = .001$, that was qualified by a significant two-way interaction between imagined contact and music type, $F(2,143) = 3.82$, $p = .024$ (see Figure 6). Simple effects analyses showed that there was not a significant effect of imagined contact condition when participants listened to negative music, $F < 1$. However, there was a significant effect of imagined contact condition when participants did not listen to music, $F(1,143) = 15.94$, $p < .001$. Participants who imagined interacting with the black individual reported a more positive attitude towards the black individual than they did towards the white individual ($M = 0.88$, $SD = 1.23$). Likewise, participants who imagined interacting with the white individual reported a more positive attitude towards the white individual than they did towards the black individual ($M = -0.25$, $SD = 1.20$). The effect of imagined contact condition was also significant when participants listened to positive music, $F(1,143) = 4.80$, $p = .030$. Again, participants who imagined interacting with the black individual reported a more positive attitude towards the black student than they did towards the white individual ($M = 0.65$, $SD = 0.94$), and participants who imagined interacting with the white individual reported a more positive attitude towards the white individual than they did towards the black individual ($M = -0.01$, $SD = 0.56$).

Finally, I examined the effects of the manipulations on participants' differences in attitudes towards the African American and Caucasian American social groups. There were no significant effects of the manipulations on this measure, main effects $F < 1$ and two-way interaction $F = 1$.

Discussion

Although the manipulations produced no significant effects on the primary dependent measures, imagining contact with a black individual did tend to reduce participants' d-scores, indicating a reduced level of bias. However, participants who imagined interacting with the black individual tended to report more positive attitudes towards the African American social group, the Caucasian American social group, the black individual, and themselves. This pattern suggests that imagining interacting with a minority may have made participants feel more positive about themselves and others, rather than only affecting their attitudes towards that specific minority group. Contrary to my predictions, imagined contact was not able to reliably reduce prejudicial bias.

Additionally, the changes made between Studies 1 and 2 to increase the vividness of the imagined interaction did not improve the effects of imagined contact, as I predicted they would. It is possible that there could have been too many instructions or the instructions could have been too specific. When West and Brukmüeller (2013) manipulated the font style of imagined contact instructions, they found that imagined contact reduced prejudice when the instructions were easy to read, but it actually increased prejudice when the instructions were difficult to read. This suggests that cognitive difficulty may be a moderator of the imagined contact effect. The additional instructions, details, and visual aids I gave to participants to enhance their mental imagery may have increased the complexity of the task, and, in turn, reduced its effectiveness. It also seems possible that when participants are given more freedom to decide what the person they are interacting with looks like or the place where the interaction is taking place, they may naturally imagine a face or location that they are more comfortable with than

the ones I provided. This increased comfort may lead to more positive mental imagery, and, in turn, increase the effectiveness of imagined contact.

Due to the inconsistencies between the overall, positive, and negative attitude scores for each target, I am not convinced that splitting the bipolar attitude scales into their unipolar equivalents provided a more accurate measure of attitudes. It is possible that participants were not comfortable reporting negative attitudes towards others, which led to a positivity bias in reporting attitudes towards the targets.

Looking at within-subjects differences in self-reported attitudes revealed that participants reported more positive attitudes towards the imagined contact partner that they had imagined interacting with than the one that they had never seen before. This demonstrates that the imagined contact manipulation was successful in helping participants bond with their imagined contact partner. However, individual participants' attitudes towards the African American and Caucasian American social groups did not differ based on their imagined contact condition. So, while participants did feel more positively towards their imagined contact partner, this positivity did not translate to their imagined contact partner's social group, like intergroup contact theory suggests that it would.

Although the music manipulation caused no striking effects, several of the dependent measures showed a larger effect of imagined contact within the negative music condition. However, for these participants, there was no within-subjects difference in attitudes towards the individuals or social groups. Therefore, while it initially looked like listening to negative music while imagining interacting with a black student helped facilitate the reduction of bias, the within-subjects difference scores suggest that this helped improve attitudes towards

multiple groups and individuals, rather than solely towards the participant's contact partner and contact partner's social group.

General Discussion

In Study 1, imagined contact created the expected change in participants' self-reported attitudes, but this change was not detected on the implicit measure of attitudes. In Study 2, imagined contact had only a slight tendency to produce the expected effects on participants' implicitly measured attitudes and self-reported positive attitudes towards the African American social group. Contrary to my predictions, imagining contact with a black individual also had a slight tendency to improve attitudes towards the Caucasian American social group. The imagined contact manipulation did successfully improve participants' attitudes towards the individual that they imagined interacting with, but this effect did not fully translate to that individual's social group. Overall, contrary to my predictions, imagining interacting with a black student did not reliably lead to a reduction of bias against the African American social group across my dependent measures. Additionally, I did not find evidence to support my hypothesis that listening to music during an imagined interaction would enhance the social bonding between participants and their imagined interaction partners, leading to an increase in prejudice reduction.

Limitations

I believe that my ability to truly investigate the ability of music to facilitate social bonding between members of different social groups was limited by the strength of my imagined contact manipulation and the sensitivity of my dependent measures. Measures of intergroup anxiety (see Crisp & Turner, 2009; Husnu & Crisp, 2010a) or future intentions to

engage in face-to-face contact (see Crisp et al., 2010) would have been beneficial to include. Since both of these measures have reliably been shown to be mediators of the imagined contact effect, they may be more sensitive to the effects of contact than my dependent measures were. Additionally, it's possible the manipulations could have been made more effective by simplifying the instructions for contact or by using an overall stronger manipulation, such as direct intergroup contact.

I predicted that sharing a musical experience with an outgroup member could enhance social bonding relative to sharing a non-musical experience with an outgroup member. It is possible that passively listening to music while imagining an interaction was not an adequate proxy for "sharing a musical experience." Instructing participants to imagine making music with an outgroup member or imagine meeting an outgroup member at a concert could have provided a more accurate exploration of my hypothesis.

Finally, there are inherent limitations involved in any research seeking to determine the evolutionary origin of music. My studies involved a very limited selection of songs, and it will be necessary to explore the social function of a variety of types and styles of music before making any claims about music as a whole. Additionally, in order to make claims about human evolution, research must expand beyond my sample of predominately white American college students to include more diverse and globally-representative samples.

Suggestions for Future Research

Imagined intergroup contact. The ability of imagined intergroup contact to reduce implicit prejudice has important implications regarding its effectiveness as an intervention. On explicit measures of attitudes, participants can easily, and sometimes unknowingly, provide

responses that reflect the most socially acceptable attitudes, rather than their actual attitudes. It is unlikely that participants can manipulate their responses in this manner on an implicit measure, like an IAT, because IAT scores are based upon millisecond differences in response times. Therefore, successful reduction of prejudice on an implicit measure provides additional evidence to help confirm that effects seen on explicit measures are a result of prejudice reduction, rather than social desirability effects.

Future research should continue to examine the effectiveness of imagined intergroup contact using implicit measures. Recent research, including my own, has been conducted based on the assumption that imagined contact is effective in reducing both explicitly measured and implicitly measured bias. In reality, few studies have demonstrated the effectiveness of imagined contact on implicitly measured attitudes (see Bergeron, 2012; Turner & Crisp, 2010; Vezzali, Capozza, Giovanni, & Stathi, 2012), and some studies have failed to find the effect (see Dermody, Jones, & Cumming, 2013; Lai et al., 2014). The first studies which observed reduced bias on an IAT following imagined intergroup contact were conducted by Turner and Crisp (2010). In one study (n = 25) they found that young people who imagined interacting with an elderly person displayed less bias against elderly people on an IAT, and in a second study (n = 40) they found that imagined contact was effective in reducing implicit bias against Muslims. However, with sample sizes much larger (n = 143; n = 149), I failed to see the expected effect of imagined contact on implicitly measured attitudes towards African Americans in either of my studies.

It is important to note that, to my knowledge, there is only one other set of imagined contact studies which have used African Americans as the target group (Lai et al., 2014). In the

first study, participants simply imagined a positive interaction with a black stranger. In the second study, participants imagined a positive interaction with a black woman and a negative interaction with a white woman. Additionally, participants in the second study were shown pictures of the two women they were supposed to imagine interacting with. To my knowledge, this is the only other imagined contact study which has provided adult participants with pictures of their imagined contact partners. Both studies used an IAT to measure the effectiveness of the manipulations, and imagined contact was not effective in reducing prejudice in either study. Given that neither my studies nor these studies found the expected effect of imagined contact using an IAT, it is possible that imagined contact is not as effective at reducing prejudice against African Americans as it is at reducing prejudice against other groups, such as the elderly (e.g., Turner & Crisp, 2010) and Muslims (e.g., Bergeron, 2012; Turner & Crisp, 2010). Additionally, providing pictures of imagined contact partners may not be an effective addition to the traditional setup of imagined contact studies. It is important that future research continues to explore the effects of imagined contact using a variety of target groups, study setups, and dependent measures in order to further clarify the optimal conditions for effective imagined contact.

Music. Given the relatively recent emergence of imagined intergroup contact, it is likely not the best paradigm for examining the ability of music to facilitate bonding between members of different social groups. I recommend that future research continue to explore this hypothesis using direct intergroup contact, since its effects are better established and understood. An ideal exploration of my hypothesis might bring members of different social groups together to physically share a musical experience by making music together. This could

be compared to a condition in which participants engage in a non-musical task which also requires that they cooperatively coordinate their actions. This setup would allow for an examination of whether music has unique social abilities which differ from the social abilities of other activities that involve similar non-musical elements.

Additionally, the effects of the manipulation in which participants physically make music together could be compared to the effects of a manipulation in which participants passively listen to music together. I would predict that both tasks would enhance social bonding, compared to a control condition. However, it is possible that making music together would create a stronger social bonding effect than listening to music together because making music is closer to the evolutionary origins of music.

Furthermore, comparing the effects of these music manipulations to control conditions in which participants engage in regular intergroup contact or no intergroup contact could provide evidence to support the use of music in real-world interventions which seek to bridge the gap between different social groups.

Conclusion

Although we are an overwhelmingly musical species, relatively little empirical research has focused of the evolutionary origins of music in human life. This small body of research suggests that music evolved as a tool to facilitate social living, possibly by promoting social bonding. It seems that, if this is true, music could be used to reduce prejudice by facilitating bonding between members of majority and minority social groups. However, the current research did not furnish support for this hypothesis. I hope that future research will improve

upon these studies and expand their scope in order to more fully explore music's ability connect us to one another.

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Figures

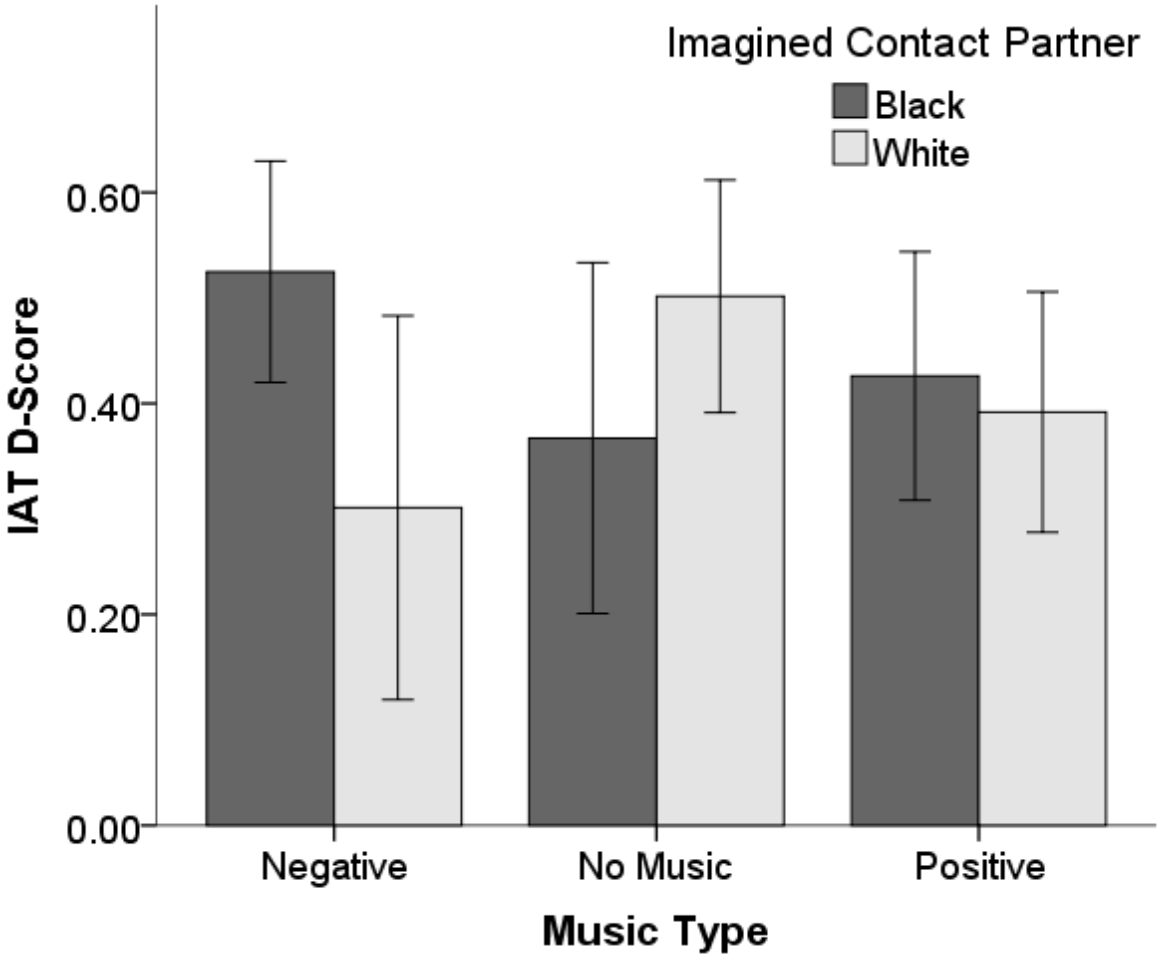

Figure 1. Mean IAT D-Score in Study 1 as a function of music type and imagined contact condition. Error bars represent the 95% confidence interval.

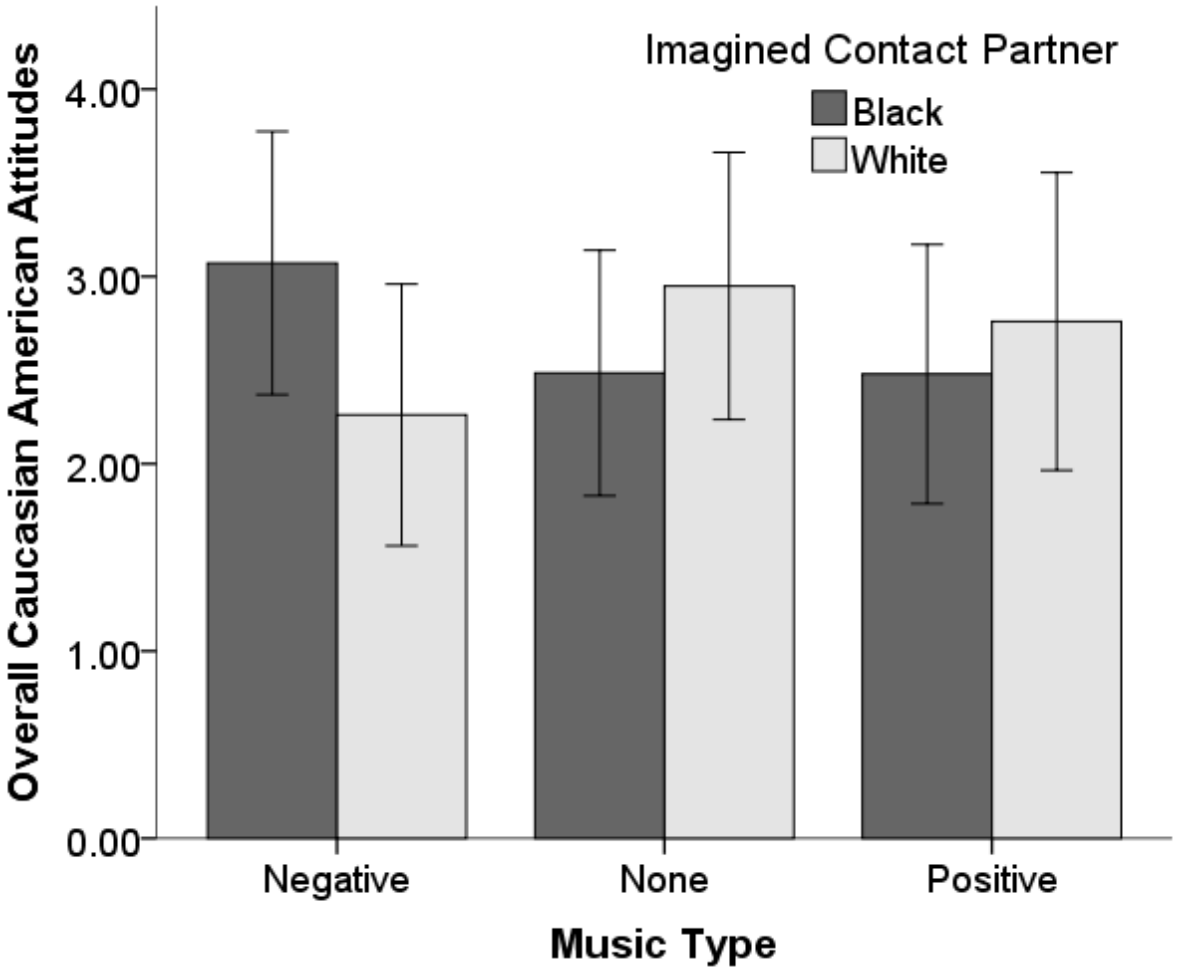

Figure 2. Mean self-reported attitudes towards the Caucasian American social group in Study 2 as a function of music type and imagined contact condition. Error bars represent the 95% confidence interval.

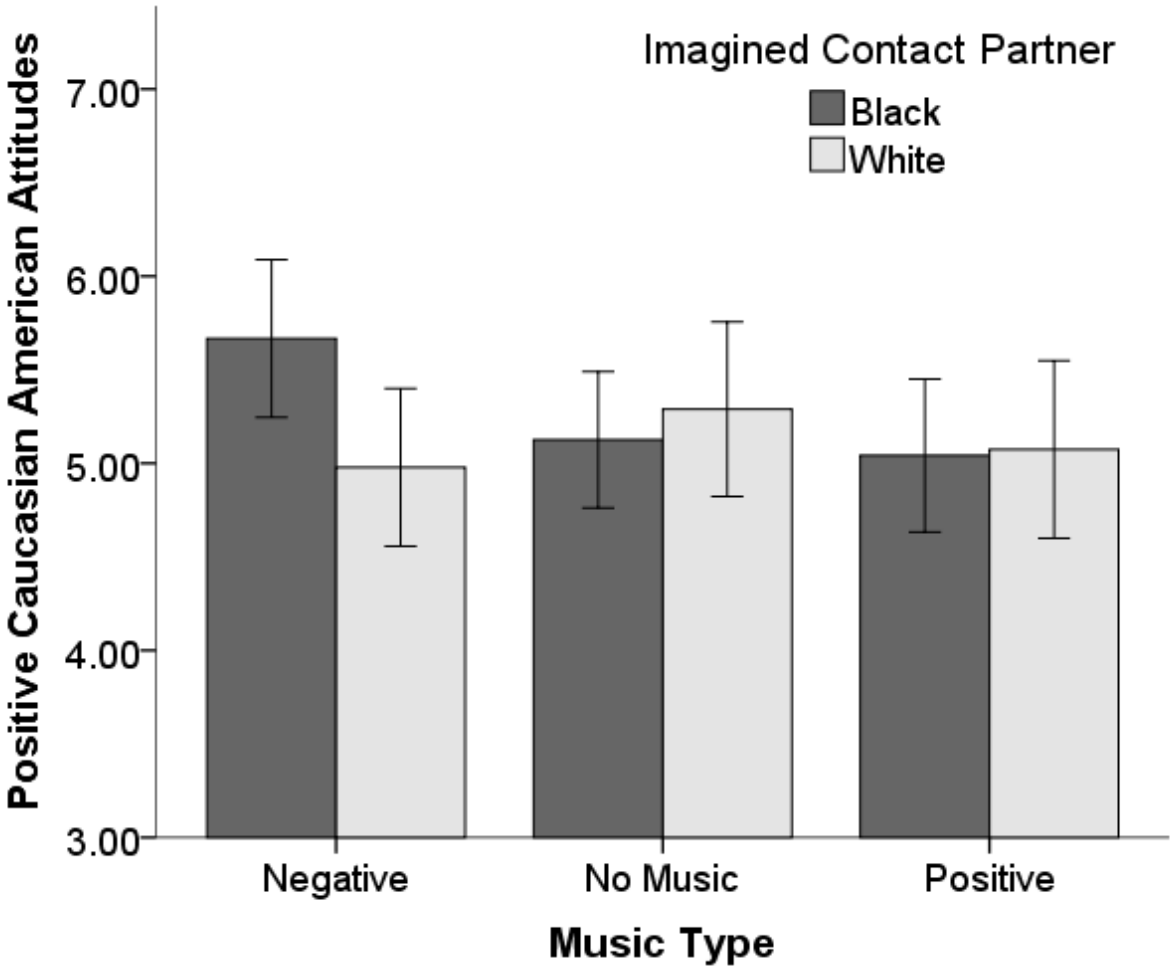

Figure 3. Mean self-reported positive attitudes towards the Caucasian American social group in Study 2 as a function of music type and imagined contact condition. Error bars represent the 95% confidence interval.

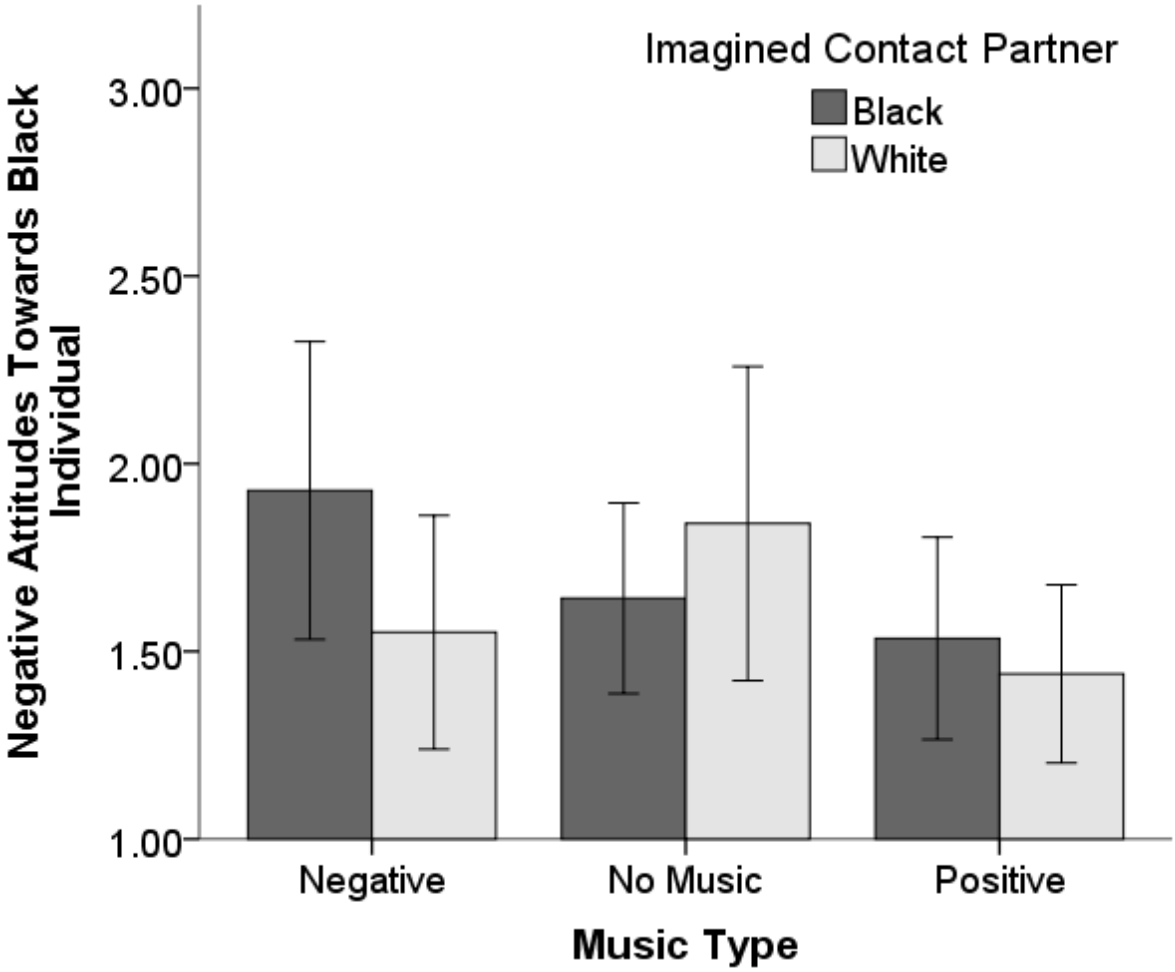

Figure 4. Mean self-reported negative attitudes towards the black individual used as an imagined contact partner in Study 2 as a function of music type and imagined contact condition. Error bars represent the 95% confidence interval.

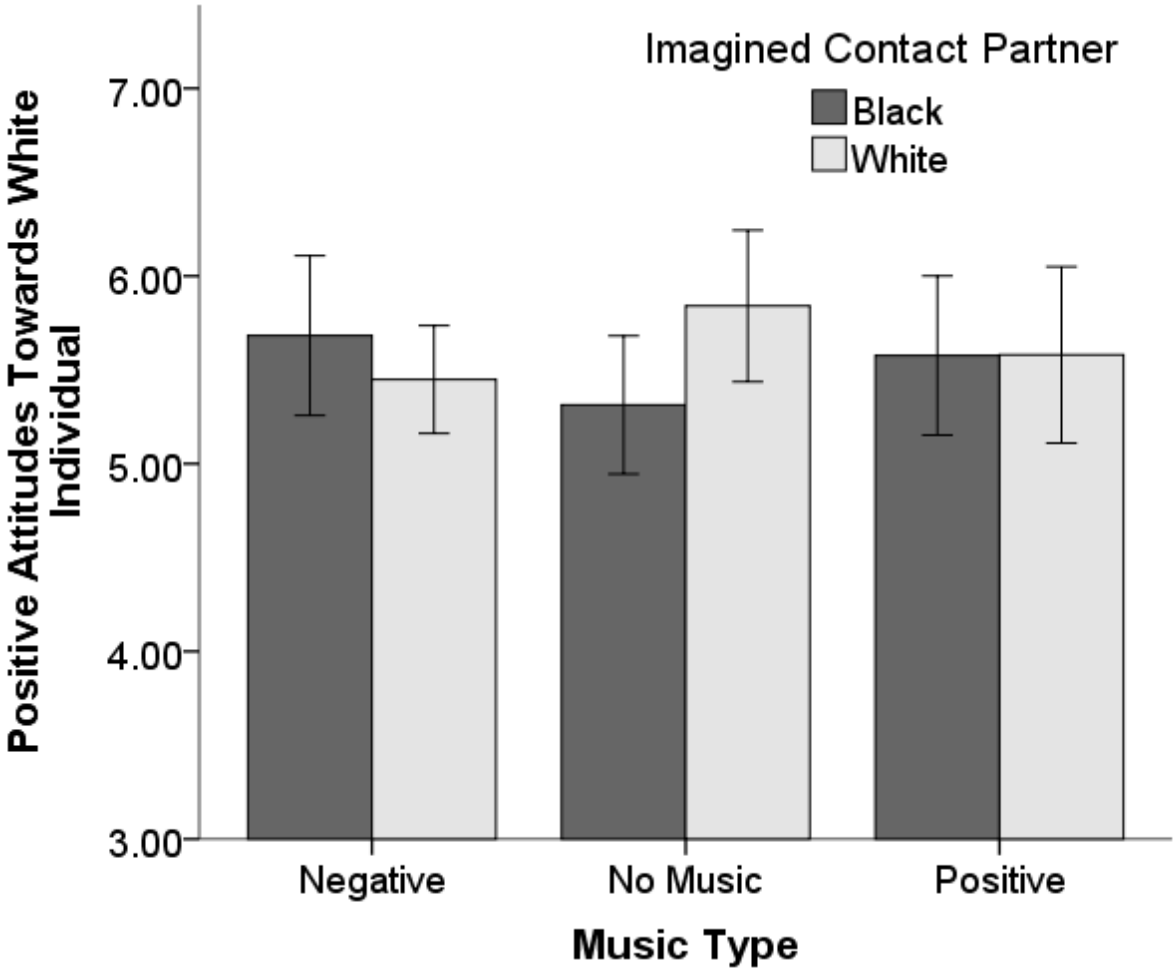

Figure 5. Mean self-reported positive attitudes towards the white individual used as an imagined contact partner in Study 2 as a function of music type and imagined contact condition. Error bars represent the 95% confidence interval.

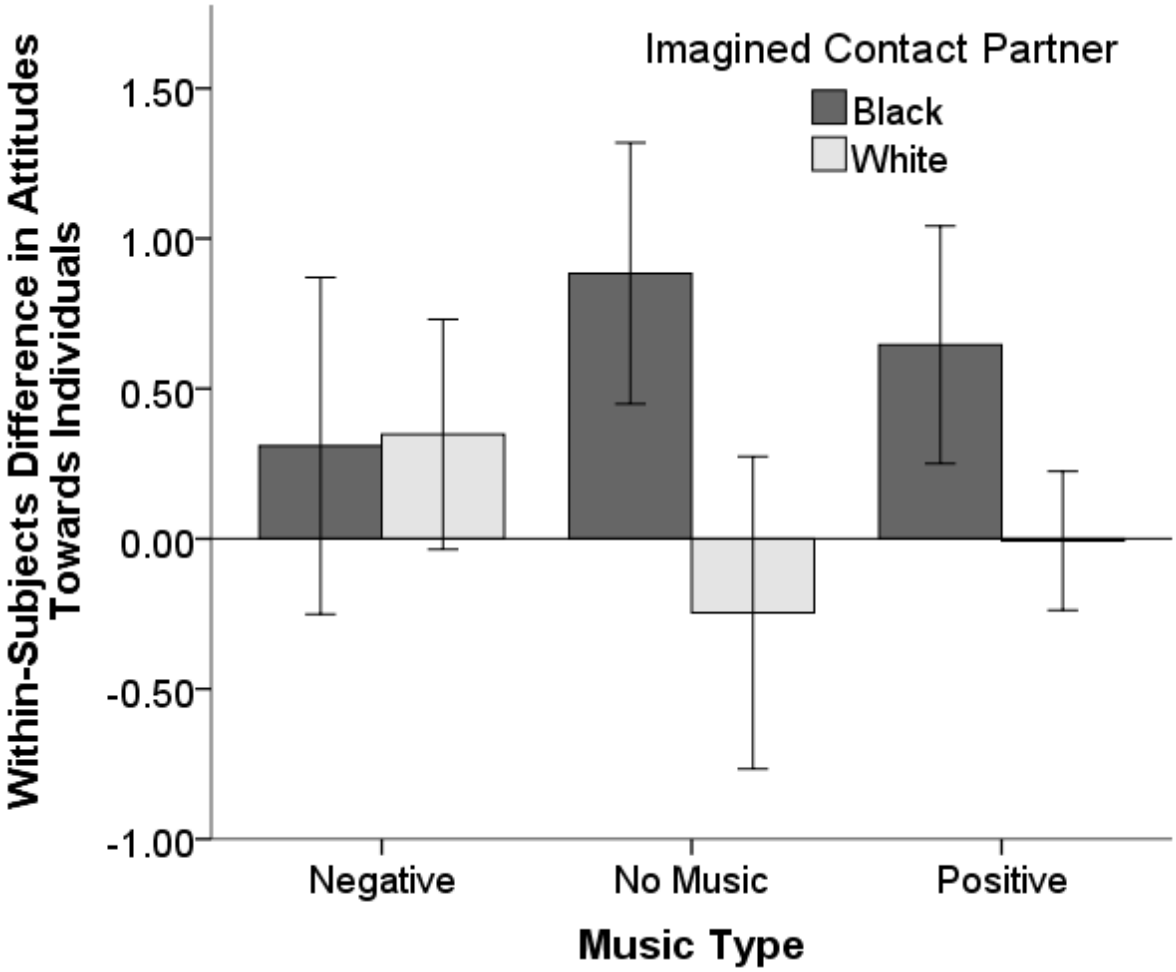

Figure 6. Mean within-subjects difference in attitudes towards the black individual and white individual in Study 2 as a function of music type and imagined contact condition. Error bars represent the 95% confidence interval.